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Stability derivatives of a oscillating wedges in viscous hypersonic flow (Conference Paper) (Open Access)

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Abstract

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In this paper an oscillating wedge has been considered, and the fluid slabs are kept at 900 to the wedge surface. The solutions of the continuity, momentum,and energy equations are obtained. By using the Rankine-Hugoniot relations for shockwaves, we can find the conditions behind the shock.This theory is unsteady one because of the consideration of effect of secondary wave reflections.Solutions are obtained for hypersonic flow over the wedge by varying different wedge semi vertex angles.These results shows extremely good consistency with Hui's predictions. When the effects of unsteadiness are considered then there is considerable change in the magnitude of the damping derivatives near the leading edge or initial 40 percent of the pivot positions and this difference is only marginal when we further down towards the trailing edge. However, this effect of unsteadiness is not visible in case of the stiffness derivatives. It is observed that the stiffness derivative increases with the increase in the wedge angle due to the increase in the plan form area of the wedge, resulting in the variation in the surface pressure distribution of the wedge. Further, due to the increment in the wedge angle the centre of pressure shifts towards the trailing edge. © Published under licence by IOP Publishing Ltd.

Indexed keywords

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